

A.4 Tricolored Blackbird (*Agelaius tricolor*)

A.4.1 Legal Status

The tricolored blackbird (*Agelaius tricolor*) is designated as a state Bird Species of Special Concern (BSSC) by the California Department of Fish and Game (DFG) (Shuford and Gardali 2008). Nest sites are protected in California under Fish and Game Code Sections 3505 and 3800.

The tricolored blackbird has no federal regulatory status; however, the species is protected under the federal Migratory Bird Treaty Act and is designated as a Bird of Conservation Concern by the U.S. Fish and Wildlife Service (USFWS 2002).

A.4.2 Species Distribution and Status

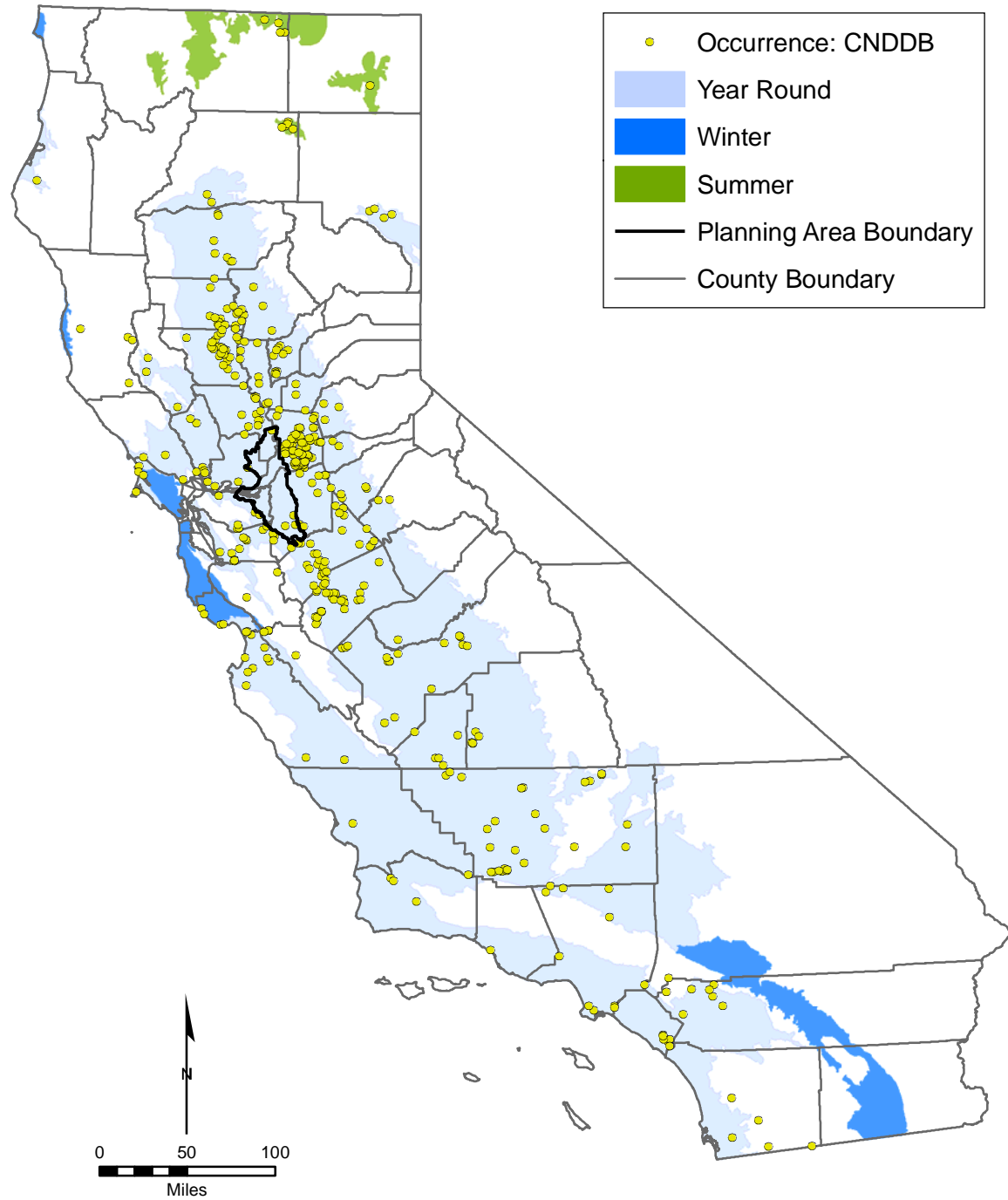
Range and Status

Tricolored blackbirds form the largest colonies of any North American passerine bird, and these may consist of tens of thousands of breeding pairs (Beedy and Hamilton 1999). Tricolored blackbirds are largely endemic to California and the state is home to more than 95 percent of the global population with breeding documented in 46 counties (Figure A.4.1) and with more than 75 percent of the breeding population occurring in the Central Valley in any give year (Hamilton 2000). Recent surveys indicate that the overall range of the species is largely unchanged since the 1930s (Neff 1937, DeHaven et al. 1975, Beedy et al. 1991, Hamilton 1998). However, while the overall the geographic distribution of breeding of the species may has not changed in historical times, there are now large gaps in their former range encompassing entire counties (e.g., Kings, San Joaquin, Riverside, San Bernardino Counties).

Historical population sizes are unknown, but by the mid-1930s – following the removal of most major wetland areas in the state, populations still likely exceeded 1.1 million adult birds (Hamilton 1998). Neff (1937) in the first systematically-conducted range-wide surveys, found the species at 252 colonies in 26 California counties, including over 700,000 adults in just eight Central Valley counties. Surveys conducted in the 1960s and 1970s indicate that range-wide populations declined by more than 50 percent during the 30 to 35 year-period since Neff's (1937) surveys in the 1930s (Orians 1961, Payne 1969, DeHaven 1975).

More recently, the USFWS, DFG, and California Audubon cosponsored systematic tricolored blackbird surveys throughout California in 1994, 1977, 1999, and 2000 (Hamilton et al. 1995, Beedy and Hamilton 1997, Hamilton 2000). Results of these surveys indicate a significantly declining trend in populations in California since the 1930s and a particularly dramatic decline since 1994. Hamilton (2000) reports a 56 percent statewide decline between 1994 and 2000 (from 369,359 to 162,508 adults), and a 69 percent decline in the Sacramento Valley during that period (from 98,362 to 30,979 adults).

The most recent statewide surveys have been coordinated by the Point Reyes Bird Observatory and California Audubon with assistance from Partners in Flight, USFWS, and DFG. Surveys conducted in 2008 included 35 counties from San Diego County to Shasta County. A total of 395,321 birds were documented, with Kern, Tulare, and Merced Counties in the San Joaquin Valley accounting for 314,936 (79.7 percent) of the total (University of California Davis 2008).



Source: California Department of Fish and Game, WHR, 2006.
California Department of Fish and Game, CNDDB, 2008

Figure A.4.1. Tri-Colored Blackbird Statewide Range and Recorded Occurrences

While survey results over the past several years may suggest a stable or possibly increasing population in the state, the data also indicate that populations continue to decline in several areas of the state where the species was formerly common, particularly in Southern California and several Central Valley counties, including San Joaquin County, where no active colonies were documented in 2008. Thus, while the number of birds may have increased statewide, they have concentrated into a significantly smaller effective range (University of California, Davis 2008).

Distribution and Status in the Planning Area

There are few reported tricolored blackbird nesting colonies from the BDCP Planning Area (Figure A.4.2). Beedy et al. (1991) report historical occurrences at Stone Lakes and at sites near Tracy, near Durham Ferry, and at Birds Landing (from Neff 1937). CNDDDB reports occurrences in and near the Yolo Bypass and near Stockton, Manteca, and Tracy in the southeast corner of the BDCP Planning Area; however, few of these are recent reports. There are no reported occurrences from the Central Delta. Statewide surveys conducted in 2008 reported no active colonies from within the BDCP Planning Area. The nearest reported active colonies were west of Byron at Marsh Creek Reservoir (University of California Davis 2008).

Thus, while the Delta region remains an important wintering area for tricolored blackbirds (Hamilton 2004), this species is an uncommon breeder in the BDCP Planning Area with historical nesting activity generally restricted to the northern and southern ends of the BDCP Planning Area.

A.4.3 Habitat Requirements and Special Conditions

Tricolored blackbirds are among the most colonial of North American passerine birds (Bent 1958, Orians 1961, Payne 1969, Beedy and Hamilton 1999). As many as 30,000 nests have been recorded in cattail marshes of 10 acres or less (Neff 1937, DeHaven et al. 1975), and individual nests may be built less than 0.5 m from each other (Neff 1937). The species' highly synchronized and colonial breeding system may have adapted to exploit a rapidly changing environment where the location of secure nesting habitat and rich insect food supplies were ephemeral and likely to change each year (Orians 1961, Collier 1968, Payne 1969).

Nesting. Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: 1) open accessible water; 2) a protected nesting substrate, including either flooded, thorny, or spiny vegetation; and 3) a suitable foraging space providing adequate insect prey within a few miles of the nesting colony (Hamilton et al. 1995, Beedy and Hamilton 1999).

As many as 20,000 to 30,000 nests have been recorded in cattail (*Typha* spp.) marshes of 10 acres or less, with individual nests less than 0.5 m from each other (Neff 1937, DeHaven et al. 1975). Nest heights range from a few centimeters (cm) to about 1.5 m above water or ground at colony sites in freshwater marshes (Neff 1937) and up to 3 m in the canopies of willows (*Salix* spp.) and other riparian trees; rarely, they are built on the ground. The species' typically selects breeding sites adjacent to open, accessible water and places its nests in a protected nesting substrate, often including either flooded or thorny or spiny vegetation. Breeding colonies must have suitable foraging space providing adequate insect prey within a few kilometers (Beedy and Hamilton 1999).

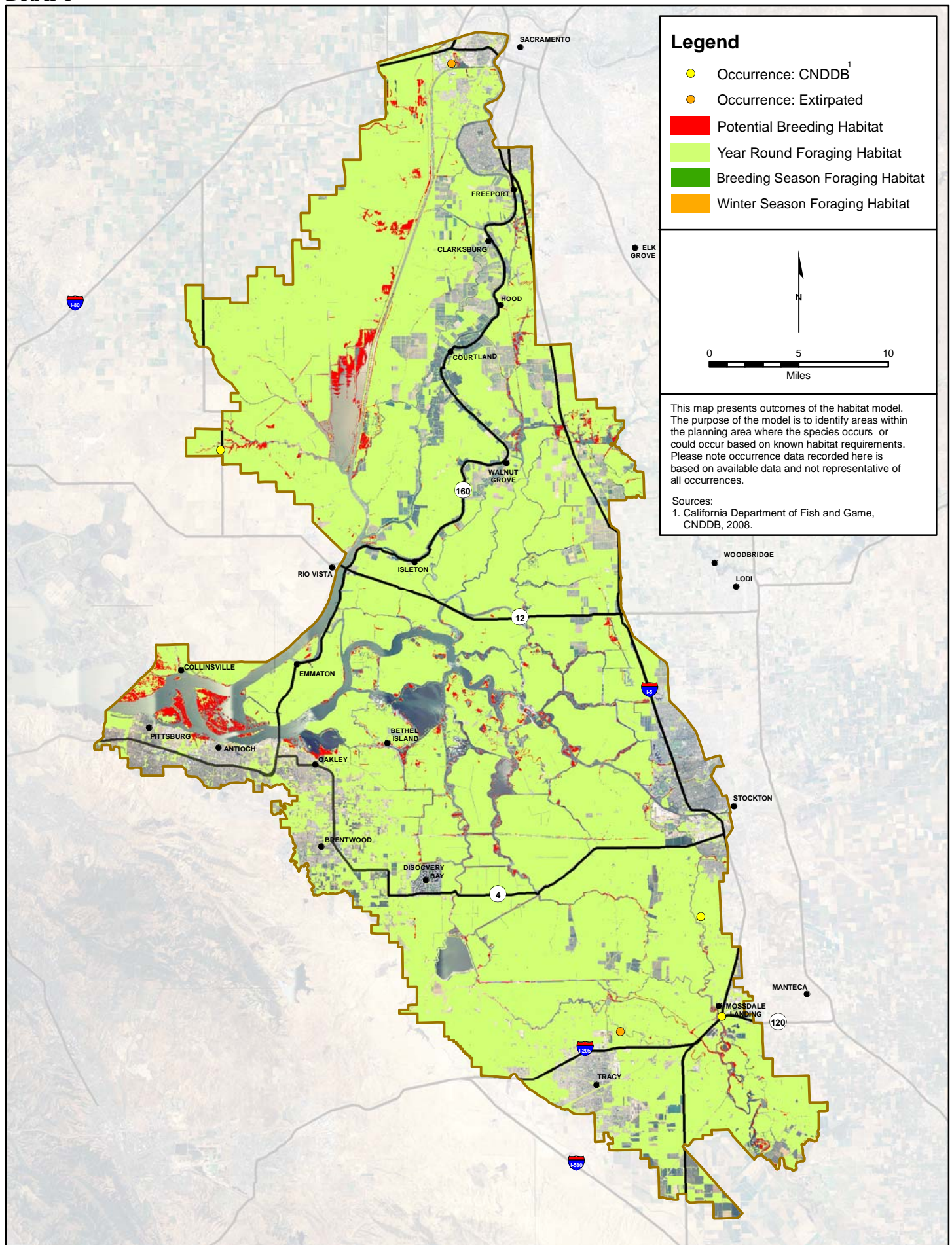


Figure A.4.2. Tri-Colored Black Bird Habitat Model and Recorded Occurrences

Males initially select breeding sites and establish nesting territories. Females select the nest site location. The first nests in a colony generally occur in the densest vegetation, usually in the interior of the nesting habitat. As the colony forms, nests are added in concentric circles gradually or in synchronous pulses (Collier 1968).

Over time, the selection of nesting habitat has changed dramatically as freshwater marsh habitat has been removed. Almost 93 percent of the 252 breeding colonies reported by Neff (1937) were in freshwater marshes dominated by tules (*Scirpus* sp.) and cattails (*Typha* sp.). The remaining colonies in Neff's study were in willows (*Salix* spp.), blackberries (*Rubus* sp.), thistles (*Cirsium* and *Centaurea* spp.), or nettles (*Urtica* sp.). In contrast, only 53 percent of the colonies reported during the 1970s were in cattails and tules (DeHaven et al. 1975).

An increasing percentage of colonies in the 1980s and 1990s were reported in Himalaya blackberry (*Rubus discolor*) (Beedy et al. 1991), and some of the largest recent colonies are in silage and grain fields (Hamilton et al. 1995, Beedy and Hamilton 1997, Hamilton 2000). Others substrates where tricolored blackbirds have been observed nesting include giant cane (*Arundo donax*), safflower (*Carthamus tinctorius*) (DeHaven et al. 1975), tamarisk trees (*Tamarix* spp.), elderberry/poison oak (*Sambucus* spp. and *Toxicodendron diversilobum*); and riparian scrublands and forests.

Foraging. Tricolored blackbirds forage in areas that provide abundant insects, including pastures, dry seasonal pools, agricultural fields such as alfalfa and rice, feedlots, and dairies. Tomatoes may occasionally be used as foraging habitat. With the loss of the natural flooding cycle and most native wetland and upland habitats in the Central Valley, breeding tricolored blackbirds now forage primarily in anthropogenic habitats. Tricolored blackbirds have been able to exploit foraging conditions created when shallow flood-irrigation, mowing, or grazing keeps the vegetation at an optimal height (<15 cm). Preferred foraging habitats include crops such as rice, alfalfa, sunflowers, irrigated pastures, and ripening or cut grain fields (e.g., oats wheat, silage) as well as annual grasslands and shrublands.

In recent years, an increasing percentage and now large majority of adults has foraged on grains provided to livestock as in cattle feedlots and dairies. Tricolored blackbirds also forage in remnant native habitats, including wet and dry vernal pools and other seasonal wetlands, riparian scrub habitats, and open marsh borders. Vineyards, orchards, and row crops (sugar beets, corn, peas, beets, onions, etc.) do not provide suitable nesting substrates or foraging habitats for tricolored blackbirds (Beedy and Hamilton 1999). Both adults feed the nestlings; adults feeding young typically forage within 3 miles of the colony, but can range up to 8 miles from the colony (Beedy and Hamilton 1999).

Some small breeding colonies may occur at private and public lakes, reservoirs, and parks provided that they are near suitable foraging habitats. Many of these colonies are surrounded by shopping centers, subdivisions, and other urban development; adults from such colonies forage in undeveloped uplands nearby.

A.4.4 Life History

Description. The tricolored blackbird closely resembles red-winged blackbird (*Agelaius phoeniceus*), with subtle differences in coloration, bill shape, and overall morphology (Beedy and Hamilton 1999). The adult male is black, with shades of glossy blue, and has a bright red patch on the wing (an epaulet), similar to that of a red-winged blackbird. However, the epaulet of tricolored blackbirds is deeper red with a white lower border, as opposed to an orange-red

1 patch with a yellowish border or no border at all. The adult females are brownish and black,
2 streaked with gray—with small reddish epaulets (rarely visible in the field), pale gray or whitish
3 chin and throat. Tricolored blackbirds have longer, slightly narrower wingtips and thinner bills
4 than the red-winged blackbirds (Beedy and Hamilton 1999).

5 **Seasonal Patterns.** Many tricolored blackbirds reside throughout the year in the Central Valley
6 of California. However, local populations can move considerable distances, and some are
7 migratory and move from inland breeding locations to wintering habitats in the Sacramento-San
8 Joaquin River Delta and coastal areas. During the breeding season, most birds nest in the San
9 Joaquin Valley and in Sacramento County in their first breeding efforts. They may later move
10 northward into the Sacramento Valley, northeast California, and southern Oregon to nest again
11 (Hamilton 1998). Thus, individual tricolored blackbirds may occupy and breed at several sites, or
12 renest at the same site, during a given breeding season, depending on environmental conditions
13 and their previous nesting success (Hamilton 1998, Beedy and Hamilton 1999, Meese 2006). In
14 fall, after the nesting season, large roosts form at managed wildlife refuges and other marshes
15 near abundant food supplies such as rice (*Oryza sativa*) and water grass (*Echinochloa crusgalli*)
16 (Beedy and Hamilton 1997). During winter, many tricolored blackbirds move out of the
17 Sacramento Valley to the Sacramento–San Joaquin River Delta. Large flocks also winter in the
18 central and southern San Joaquin Valley, and at the dairy farms in coastal areas such as Point
19 Reyes and Monterey County (Beedy and Hamilton 1997). In early March to early April, these
20 flocks move from wintering areas to their breeding colonies in Sacramento County and the San
21 Joaquin Valley (Beedy and Hamilton 1997).

22 **Reproduction.** Tricolored blackbirds nest colonially, enabling them to synchronize their timing
23 of nest building and egg laying (Beedy and Hamilton 1999). A few breeding colonies
24 documented during fall months (September to November) had more protracted nest-building
25 periods that led to asynchronous egg laying and fledging of young (Orians 1960). Females
26 usually breed in their first year, but most males apparently defer breeding until they are at least 2
27 years old (Payne 1969). Females typically lay three to four eggs and incubate them for 11 to 14
28 days (Emlen 1941, Orians 1961); then both parents feed young until they fledge 9 to 14 days
29 after hatching (Beedy and Hamilton 1999).

30 Hatching to fledging requires approximately 24 days. Thus, a successful nesting effort requires
31 approximately 45 days from nest initiation to independence of young (Hamilton et al. 1995).
32 However, because birds may continue to be recruited into the nesting colony following the initial
33 nest establishment, the colony itself remains active and in various stages of the breeding cycle
34 for an extended period. This period may sometimes last more than 90 days, but generally
35 requires a minimum of 50 days for a complete breeding cycle of a less asynchronous colony
36 (Beedy and Hamilton 1997).

37 **Foraging Behavior and Diet.** Like other blackbirds, tricolored blackbirds often forage in
38 flocks. They usually forage on the ground by walking, hopping, or taking short flights. Most
39 forage within 3 miles of their colony sites (Orians 1961).

40 Diets of adult tricolored blackbirds are dependent on geographic location and the availability of
41 local insect foods. Among the most important prey for adults provisioning nestlings include
42 Coleopterans (beetles), Orthopterans (grasshoppers, locusts), Hemipterans (true bugs), other
43 larval insects, and Arachnids (spiders and allies) (Crane and DeHaven 1977, Beedy and Hamilton
44 1999). The primary diet of a colony depends on the local food availability (large hatches of
45 dragonflies [Odonata] are especially favorable to this species [Meese pers. comm. as cited in:

Yolo Natural Heritage Program 2008]). Individuals are also attracted to large outbreaks of grasshoppers (Orians 1961). Adult females require insects to form eggs, and nestlings require insects since they are unable to digest plant materials until they are at least 9 days old and ready to leave their nests (Beedy and Hamilton 1999). During the non-breeding season, tricolored blackbirds often congregate at dairy feedlots to consume grains and other livestock feed, while others forage on insects, grains, and other plant material in grasslands and agricultural fields (Beedy and Hamilton 1999, Skorupa et al. 1980).

A.4.5 Threats and Stressors

Habitat Loss and Alteration. The most significant historical and ongoing threat to the tricolored blackbird is habitat loss and alteration. The initial conversion from native landscapes to agriculture removed vast wetland areas in the state and caused initial declines in populations. The more recent conversion of suitable agricultural lands to urbanization has permanently removed historical breeding and foraging habitat for this species.

In urbanizing areas, habitat fragmentation and proximity to human disturbances has also led to abandonment of large historical colonies.

In Sacramento County, a historical breeding center of this species, the conversion of grassland and pastures to vineyards expanded from 7,537 acres in 1996 to 13,171 acres in 1998 (DeHaven 2000) to 16,709 acres in 2003 (California Agricultural Statistics Service, <http://www.nass.usda.gov/ca>). Conversions of pastures and grasslands to vineyards in Sacramento County and elsewhere in the species' range in the Central Valley have resulted in the recent loss of several large colonies and the elimination of extensive areas of suitable foraging habitat for this species (Cook 1999, DeHaven 2000, Hamilton 2004, Yolo Natural Heritage Program 2008).

Direct Mortality During Crop Harvest. Entire colonies (up to tens of thousands of nests) in cereal crops and silage are often destroyed by harvesting and plowing of agricultural lands (Beedy and Hamilton 1999, Hamilton 2004, Cook and Toft 2005). While adult birds can fly away, eggs and fledglings cannot. The concentrations of a high proportion of the known population in a few breeding colonies increases the risk of major reproductive failures, especially in vulnerable habitats such as active agricultural fields (Yolo Natural Heritage Program 2008).

Predation. Historical accounts documented the destruction of nesting colonies by a diversity of avian, mammalian, and reptilian predators (Beedy and Hamilton 1999). Recently, especially in permanent freshwater marshes of the Central Valley, entire colonies have been lost to black-crowned night-herons (*Nycticorax nycticorax*) and common ravens (*Corvus corax*). Recently, cattle egrets (*Bubulcus ibis*) have been observed preying on tricolored blackbird nests, and at one colony in Tulare County, more than 125 egrets were present throughout the breeding season (Meese 2007). Some large colonies (up to 100,000 adults) may lose greater than 50 percent of nests to coyotes (*Canis latrans*), especially in silage fields, but also in freshwater marshes when water is withdrawn (Hamilton et al. 1995). Thus, water management by humans often has the effect of increasing predator access to active colonies (Yolo Natural Heritage Program 2008).

Human Disturbances. Tricolored blackbird colonies are highly sensitive to human disturbances. Close proximity to urbanizing areas can cause colonies to be permanently abandoned. Increases in noise, loose pets, and human presence can cause nest abandonment. Even entry into colonies for management or scientific purposes can cause disturbances and should be avoided (Beedy and Hamilton 1999).

Poisoning and Contamination. Various poisons and contaminants have caused mass mortality of tricolored blackbirds. McCabe (1932) described the strychnine poisoning of 30,000 breeding adults as part of an agricultural experiment. Neff (1942) considered poisoning to regulate numbers of blackbirds preying upon crops (especially rice) to be a major source of mortality. This practice continued until the 1960s, and thousands of tricolored blackbirds and other blackbirds were exterminated to control damage to rice crops in the Central Valley. Beedy and Hayworth (1992) observed a complete nesting failure of a large colony (about 47,000 breeding adults) at Kesterson Reservoir, Merced County, and selenium toxicosis was diagnosed as the primary cause of death. At a colony in Kern County, all eggs sprayed by mosquito abatement oil failed to hatch (Beedy and Hamilton 1999). Hosea (1986) attributed the loss of at least two colonies to aerial herbicide applications (Yolo Natural Heritage Program 2008).

Other Conservation Issues. Important information gaps in the ecology of the species include the effects of land use changes on the reproductive success of colonies and on the distribution of wintering birds, the relationship of invertebrate prey abundance and brood size, winter distribution, diet, and survival rates, and measures of suitable foraging habitat (Beedy and Hamilton 1999, Meese 2007).

Tricolored Blackbirds have been the focus of recent management concern due to population decline, very limited global range, and vulnerability of large breeding colonies to habitat losses, predation, and human-induced impacts.

A.4.6 Relevant Conservation Efforts

There are no local, regional, or statewide conservation efforts that are specific to the conservation of the tricolored blackbird. However, a Conservation Strategy for this species was prepared recently (Tricolored Blackbird Working Group 2007). Recommendations for the species conservation (Beedy and Hamilton 1999, Hamilton 2004) include frequent monitoring of breeding and wintering population sizes, colony locations, and reproductive success; protection of colony locations and foraging habitats; protection of colonies on farmland by avoiding harvesting/tilling until young have fledged; providing adequate protection in Habitat Conservation Plans; focusing on dairy-dependence for breeding and wintering populations; developing or restoring breeding habitat near reservoirs, rice fields, alfalfa fields and other optimal foraging habitats; and managing major predators in or near breeding colonies, including common ravens, black-crowned night-herons, cattle egrets, and coyotes when feasible.

A.4.7 Species Habitat Suitability Model

Nesting Habitat: There are few reported historical occurrences of tricolored blackbird breeding colonies within the planning area (Neff 1937, Beedy et al. 1991, CNDDDB 2008), and no recent occurrences (University of California, Davis 2008). This is likely due in part to the lack of breeding habitat throughout most of the Delta.

Potentially suitable breeding habitat within the planning area includes all bulrush (*Scirpus* spp.) and cattail (*Typha* spp.) alliances and blackberry (*Rubus* spp.) brambles located within 500 meters of open water including:

- Managed Wetlands
 - *Scirpus* spp. in managed wetlands
- Freshwater Permanent Emergent Wetlands
 - Broad-leaf cattail (*Typha latifolia*)

- Tidal Freshwater Emergent Wetlands
 - All *Scirpus*/*Typha*-associated types
- Valley Riparian
 - *Rubus discolor* Alliance
 - *Salix exigua*-(*Salix lasiolepis*)-*Rubus discolor*

Assumptions: Beedy et al (1991) report breeding colonies occupying sites as small as 0.1 acre. Therefore, all potentially suitable vegetation types are considered potential breeding habitats regardless of patch size. Hamilton (2004) reports that open water within 500 meters of nesting substrate is a requirement for colony settlement.

Other important factors regarding the selection of breeding sites include the condition of the vegetation and the extent of open water associated with emergent vegetation along canals. For example, Hamilton (2004) suggests that cattail marsh that has not been recently burned may be too dense and preclude settlement. Hamilton (2004) also suggests that strips of emergent vegetation along canals that are less than 10 meters wide may be avoided due to insufficient open water habitat. However, because these factors cannot be adequately identified using the available mapping tools, for purposes of this model all potentially suitable vegetation types are considered potential breeding habitats regardless of condition and all potentially suitable habitat along canals is considered potential breeding habitat regardless of canal width. Thus, this model may overestimate potentially suitable breeding habitat.

Foraging Habitat: Breeding season foraging habitat includes all grassland, managed seasonal wetland, natural seasonal wetland, and tidal freshwater emergent wetland categories, and all agricultural lands with the exception of vineyards and orchards within 13 km (8 miles) from potentially suitable breeding habitat. Winter season foraging habitat includes all of these categories without distance restrictions.

Assumptions: During the breeding season, tricolored blackbirds usually forage within 5 km (3.1 miles) of the colony, but can range up to 13 km (8 miles) from the colony (Beedy and Hamilton 1999). However, during the winter the species forages widely throughout the planning area without regard to proximity of colony sites or breeding habitats.

Suitable agricultural lands generally include pasturelands, grain and hay crops, safflower and sorghum, and certain other annually rotated irrigated crops. Tricolored blackbirds also forage in livestock feedlots, dairies, and poultry farms. However, not all agricultural crop types are considered suitable for foraging. Because crop patterns rotate seasonally or annually, for purposes of this model all crop types are considered suitable foraging habitat except vineyards and orchards, which do not rotate seasonally or annually. Because all seasonally or annually rotated crop types are included, this model will overestimate available foraging habitat in any given year.

A.4.8 Recovery Goals

A recovery plan has not been prepared for this species and no recovery goals have been established.

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